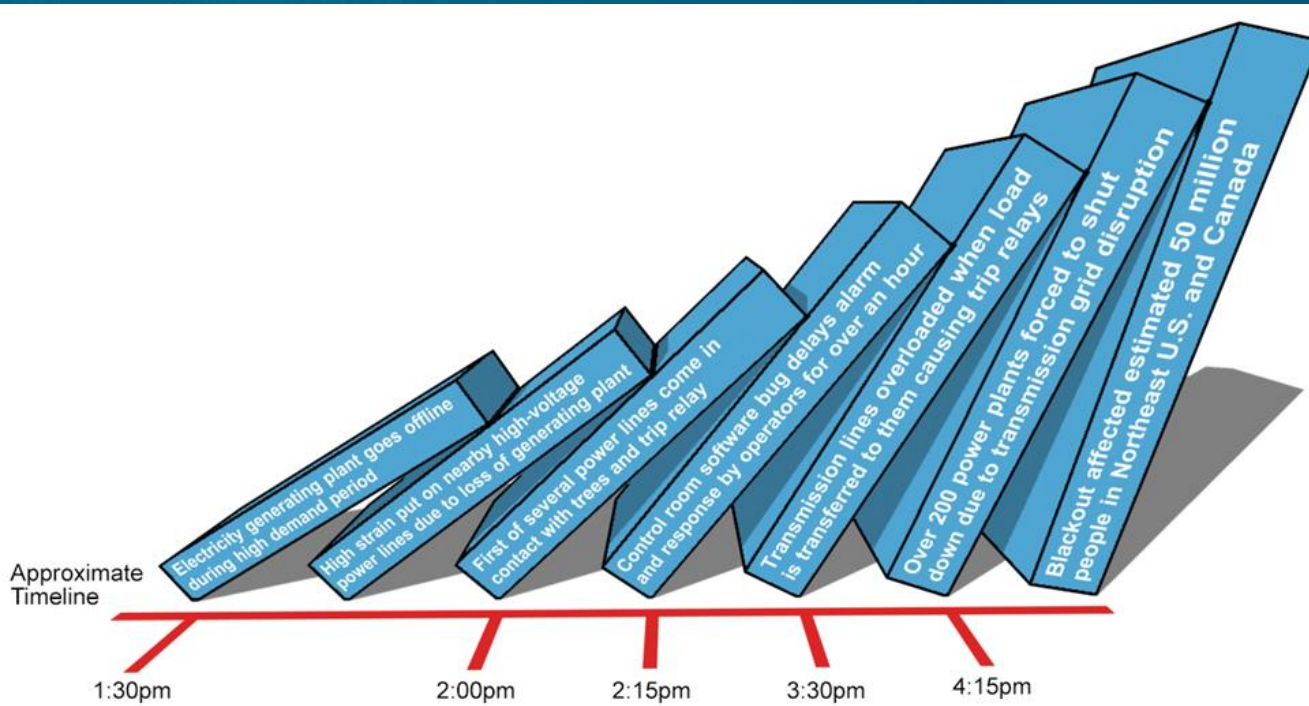


Chapter 10: Dependencies and Cascading Effects

Presenter:

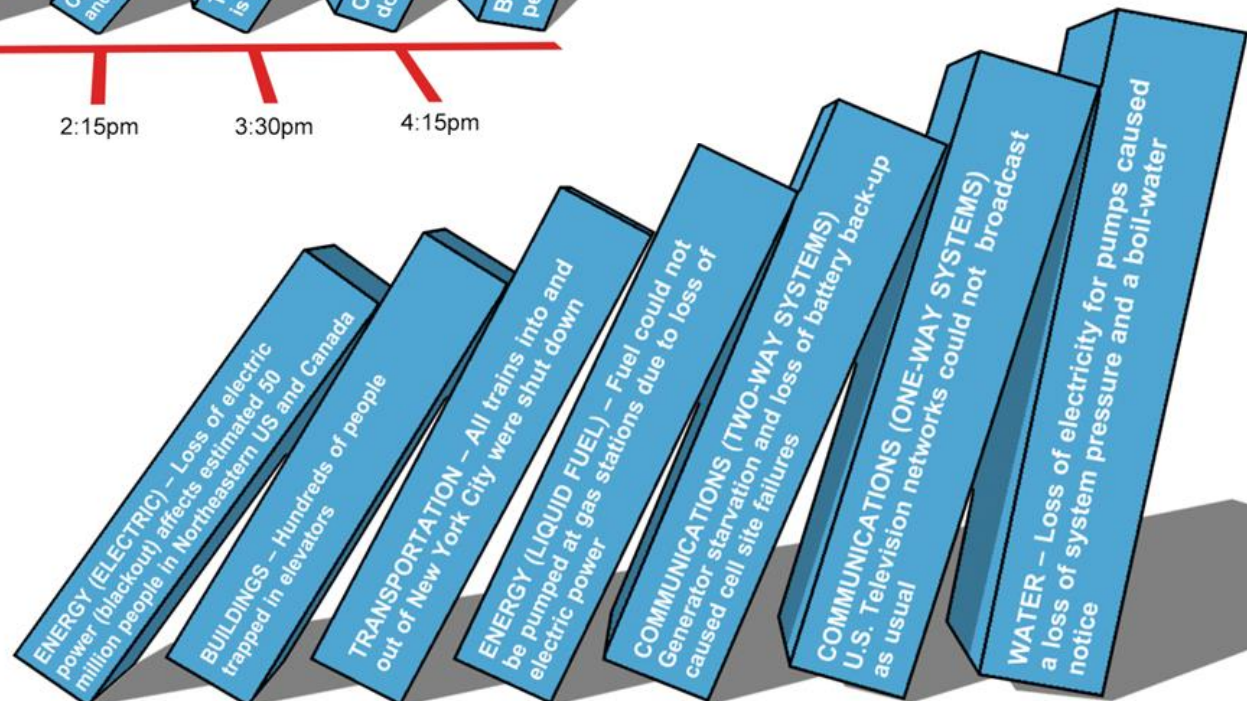
**Kent Yu, PhD, PE, SE
SEFT Consulting Group, LLC**

Cascading Effects



Power System
INTERNAL
Cascading
Failure
(2003 NE
Blackout)

Power System
EXTERNAL
Cascading
Failure
(2003 NE
Blackout)



Dimensions of Dependencies

- Internal and External
- Time
- Space
- Source

(These dimensions may not be independent)



Internal and External Dependencies

- Internal Dependency (examples)
 - Physical Infrastructure System
 - Equipment and Repair Supplies
 - Operations Center (and more)
- External Dependency (examples)
 - Transportation
 - Power
 - Communication (and more)

(It is also good to consider who may depend on your system)



Time Dimension

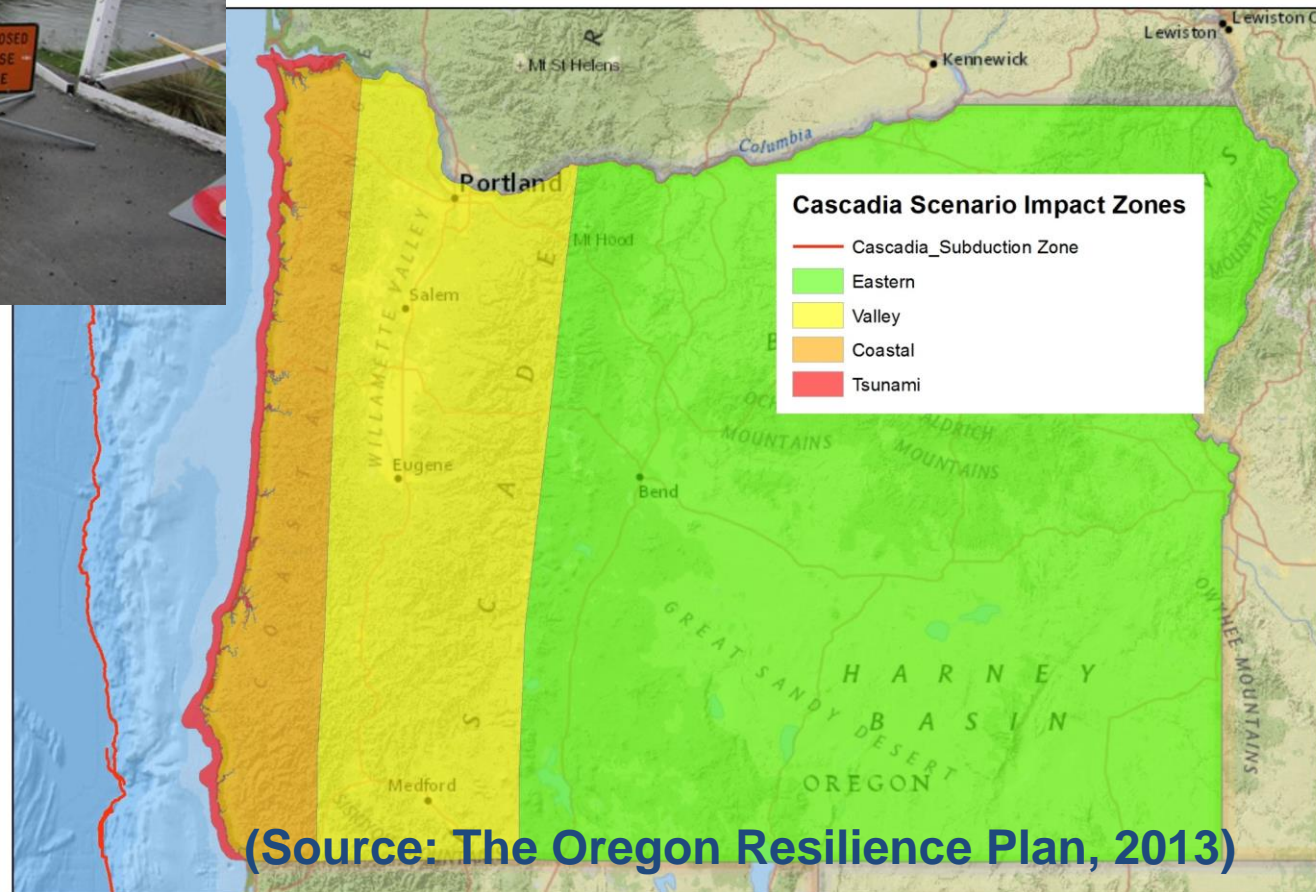
- Recovery Phases
 - Short-Term, Intermediate, and Long-Term
- Dependencies may change from one phase to another
- Performance goals, and restoration sequence and pace are influenced by external dependencies of other infrastructure systems and community needs



(Source: FEMA, 2014)



Space Dimension



Source Dimension



(Courtesy of Yumei Wang, DOGAMI)

Additional Examples

- Wholesale Water Supplier
- Wholesale Power supplier
- Centralized Warehouse of A Healthcare System

